MEMORANDUM

TO: Hon. Chairperson Barbara Carey-Shuler, Ed., D. and Members, Board of County Commissioners

DATE: April 13, 2004

SUBJECT: Status Report – Northwest Wellfield Studies

FROM: George M. Burgess
County Manager

Background

The Miami-Dade Water and Sewer Department (MDWASD) operates the Northwest Wellfield, in the western part of Miami-Dade County, which provides water supply to nearly one million people. Chapter 24 of Miami-Dade County Code includes provisions to limit adverse impacts from residential (septic systems), commercial, and industrial uses to the Northwest Wellfield (NWWF), and to all wellfields throughout the County. The Code currently uses the estimated travel times of groundwater flowing through the aquifer to establish minimum distances from the wells for the types and intensities of land uses that are allowed within the wellfield protection areas. Protection measures include limitations on the location and depth of rock mining; see Exhibit 1 for the various protection zones. Excavating (i.e. rock mining) is currently prohibited within the estimated 30-day travel time from any public utility potable water supply well. Limited excavation with a depth restriction of 40 ft. is allowed between the 30-day and the 210-day regulatory zones however, miners prefer to excavate much deeper which requires an additional buffer of 30 days travel time beyond the current 30 day regulatory zone.

In spite of the fact that the Code currently allows rockmining outside the "60-day travel time zone", there is a recent concern that if excavations are allowed too close to the water supply wells, the wells could be determined to be influenced by the surface waters. United States Environmental Protection Agency (USEPA) regulations require public water systems whose source is "groundwater under the direct influence of surface waters (GWUDI)" to provide the same level of treatment as surface water sources. The USEPA regulations define GWUDI as a ground water with significant occurrence of insects or other macro-organisms, algae, or large diameter pathogens such as *Giardia*. This is significant because certain pathogenic, disease-causing, organisms can live in surface water but not in true groundwater. The County has always assumed that all our wellfields are "groundwater sources" since all our water is withdrawn from wells. As a result, our water treatment plants provide treatment corresponding to groundwater treatment levels, not the higher levels of treatment required for surface waters sources.

In 1997, the USEPA methodology to determine whether or not a ground water source is GWUDI was used to determine the status of the County's wellfields. The characterization required by USEPA has two components: first, it prohibits the presence of certain pathogenic organisms called *Cryptosporidium* and *Giardia* in the wellfields. The second part of the USEPA analysis, called Microscopic Particulate Analysis (MPA), detects the presence of algae and other microscopic organisms that are indicators of surface water, and assigns a level of risk based on the number of organisms found. The first MPA analysis performed indicated that five wells in the County's Northwest Wellfield exceeded the allowable level of risk. However, MDWASD determined that this was due to construction deficiencies, and the

Board approved a consent agreement with the Florida Department of Environmental Protection (FDEP) in 1998 to correct these deficiencies. It is important to note that for the past 8 years, MDWASD has been testing the water supply for *Giardia* and *Cryptosporidium* and these pathogens have not been detected in any of our wellfields.

Since the reconstruction of these wells, the concentration of surface water indicators has decreased to acceptable levels but has not disappeared completely. The continued presence of low concentrations of surface water indicators in the Northwest Wellfield may indicate some continuing connection to surface water, although so far not at levels that would trigger additional treatment requirements at the water plants. If the wellfield is not protected from the potential risks associated with surface waters, the wellfield could be declared GWUDI. Upon this determination, the water treatment plant may have to be upgraded to meet surface water treatment standards. The cost of such upgrade is estimated to be $70 million.

In 1992, the Florida Legislature established the Lake Belt Committee who developed a long-term plan for the Lake Belt Area. The plan focused upon balancing limestone mining interest, environmental concerns related to wetland protection, and water supply protection. The Lake Belt Phase II Plan completed in 2000 recommended a reassessment of the wellfield protection boundaries, a risk assessment study to identify appropriate rock mining distance from the wellheads, and to amend the County's Code addressing the Protection of Public Potable Water Supply Wells according to the findings of the studies.

County's Risk Assessment Study

In 2001, Phase I of the Risk Assessment Study was conducted to identify appropriate rock mining setbacks distances based upon die-off rate of *Cryptosporidium* as the only factor. The resulting setbacks were greater than the current setback of "60-days". The assessment concluded that additional studies were needed to determine the extent to which the limestone aquifer provides filtering or straining, and how that ultimately could affect rock mining setback boundaries when factored into the risk analysis. On July 9, 2002, the Board, through Resolution No. R-717-02, authorized a joint funding agreement between the U.S. Geological Survey (USGS) and Miami-Dade County to initiate this study (Phase II). Additionally, on October 22, 2002, the Board, through Resolution No. R-1233-02, ratified the execution of three agreements with the American Water Works Association Research Foundation to provide additional funding for the subject.

The subject study involves the installation of multiple wells (monitoring, production, injection) for dye and particle tracer tests over a large area, in addition to laboratory work performing "column studies" of aquifer cores. The tracer tests involve injecting a product (i.e. dye or particle) into the groundwater and analyzing its movement through the aquifer. Column studies involve simulating that activity in a laboratory setting with core samples obtained from wells drilled in the immediate area. Planning for the associated field and laboratory work commenced in July 2002. Aquifer cores were collected for the column studies and analysis is ongoing at a USGS research facility in Boulder, Colorado.

The initial dye tracer test took place the morning of April 22, 2003. The test utilized Rhodamine WT dye to study and quantify aquifer characteristics in the vicinity of the wellfield in order to obtain information necessary to develop the more critical particle tracer test. The amount of dye that was used in the initial test was calculated using currently accepted aquifer data for the area, including data used in both County and South Florida Water Management District groundwater models. Instead of arriving as predicted at

the test well and ultimately the water plant in a period of several days at levels too low to be visible, most of the dye was noticed at the Preston Water Treatment Plant later that evening, within about 8 hours. MDWASD staff purged most of the affected water from the plant and much of the distribution system the same night, substantially minimizing the number of customers exposed to pink tinted tap water the following morning. Although the field tracer test had to be prematurely terminated, the quality of data obtained from the test will allow researchers to adequately design the particle tracer test planned for the 2004 dry season.

The results of the dye tracer test, although preliminary in nature, suggest that preferential flow zones exist within the aquifer in the vicinity of the wellfield (production wells). These zones may consist of interconnected voids, fractures, spaces, or porous areas in the rock which allow for the rapid movement of large volumes of groundwater. The extent to which such flow zones might be present is not completely understood at this time. However, images taken for a monitoring well drilled in early October 2003 clearly show the existence of these preferential flow zones (see Exhibit 2). These results also suggest that the current groundwater models for the Northwest Wellfield Area may need to be modified, particularly with more detailed, hydrologic data, to account for the site specific characteristics. County staff is currently investigating surface mapping of potential preferential flow zones in and around the Northwest wellfield. Once this part of the study is completed, the Department of Environmental Resources Management (DERM) will update the risk assessment study that was performed in 2001 and incorporate new hydrologic data into models used to determine travel-time setbacks. The revised risk assessment study will be used to determine whether the existing rockmining setbacks based on 30 and 60 days need to be expanded to more protective, higher travel time days. In either case, the new hydrologic data most probably will indicate that the existing protection zones do not represent realistic dynamics between existing and proposed lakes and the drinking water wells. If necessary, expanded setbacks will be incorporated into an ordinance for public review and Board consideration. It is anticipated that the study will be completed by April 2005

Land Acquisition and Exchanges

On June 6, 2000, the Board, through resolution R-570-00, authorized the employment of appraisers for 60 parcels, totaling approximately 1,200 acres and authorized the County Manager to negotiate with the owners to acquire the properties deemed necessary to protect the Northwest Wellfield, within the 60-day travel time zone. As of today, the MDWASD has acquired 96.25 acres within this zone.

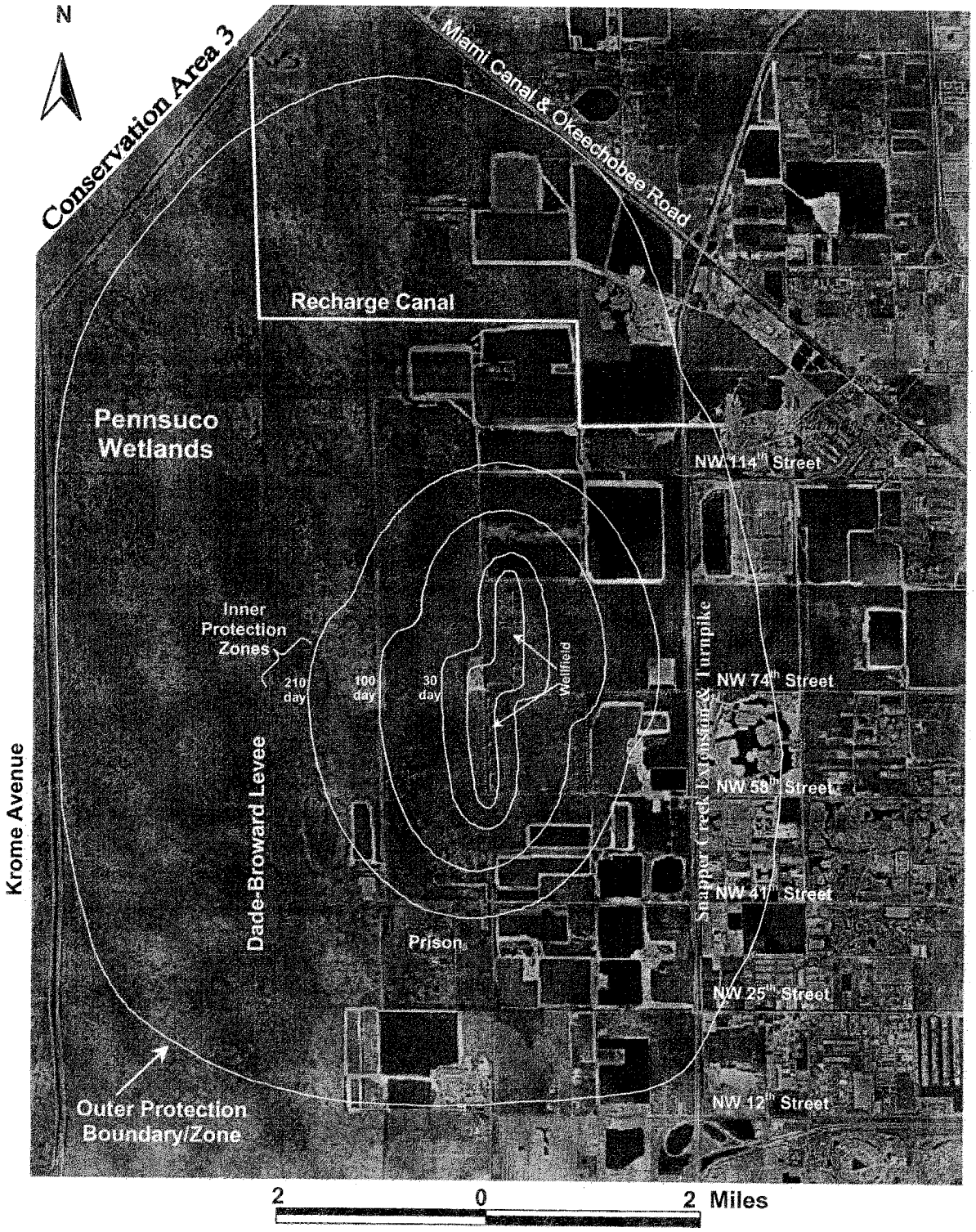
The Lake Belt Phase II Plan recommended that the State acquire all lands within the nearby Pennsuco wetlands. Several mining companies expressed interest in mining state-owned lands in exchange for preservation of private lands they held in the Pennsuco wetlands. On November 25th, 2003, the Florida Cabinet approved a land exchange under which the State conveyed 238.9 acres of state-owned land for 202.50 acres owned by Florida Rock Industries. In this exchange, 42.50 acres owned by Florida Rock, within the current 30 and 60-day travel time from the wellheads, and 160 acres in Pennsuco were transferred to the State of Florida for 90 acres owned by the State in Section 15, just west of the present 60-day protection line, and 148.7 acres in Section 9, just east of Pennsuco, see Exhibit # 3. The County initially objected to this exchange because the 90 acres of the state owned land in Section 15, being transferred to Florida Rock, are located within the area where preliminary modeling indicate a revised and updated 60-day protection zone will be located. The County's concerns were presented to the Florida Cabinet staff and to Florida Rock representatives. As a result of these discussions, the County and Florida Rock entered into and Agreement in Principle (see Exhibit 4) that states that if the Board were to approve

the extension of the 60-day protection zone, to the area where the parcels just acquired are located, then the County has an exclusive and irrevocable option to Purchase the properties in Section 15. The MDWASD is currently preparing the Option to Purchase Agreement, to be executed by the County Manager. The County has until March 15th, 2006 to exercise the Option to Purchase.

Reports will be provided to the Board of County Commissioners periodically.

T. Manto for Pedro G. Hernandez
Assistant County Manager

EXHIBIT 1
Northwest Wellfield's Watershed and Protection Zones



Horizontal conduit flow class in limestone of Fort Thompson Formation

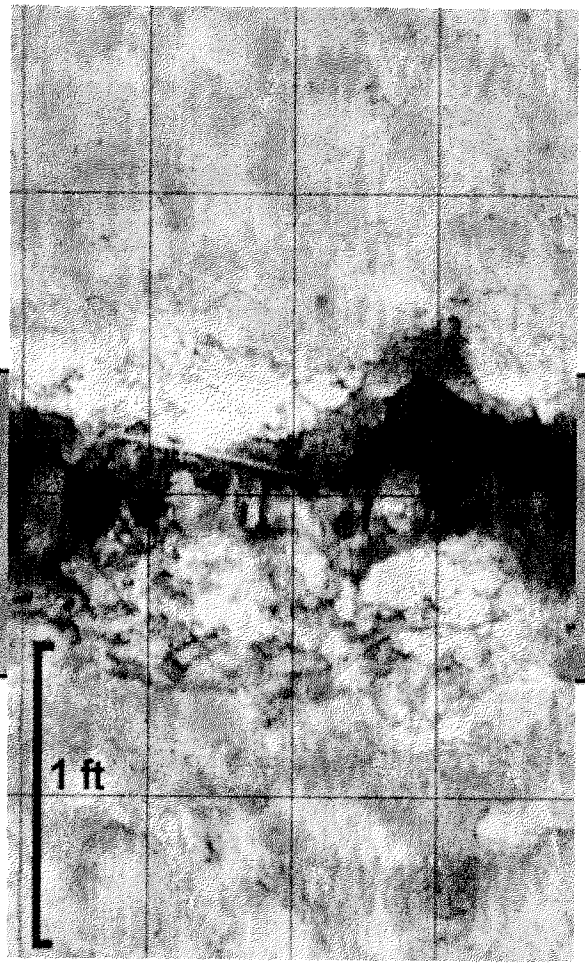
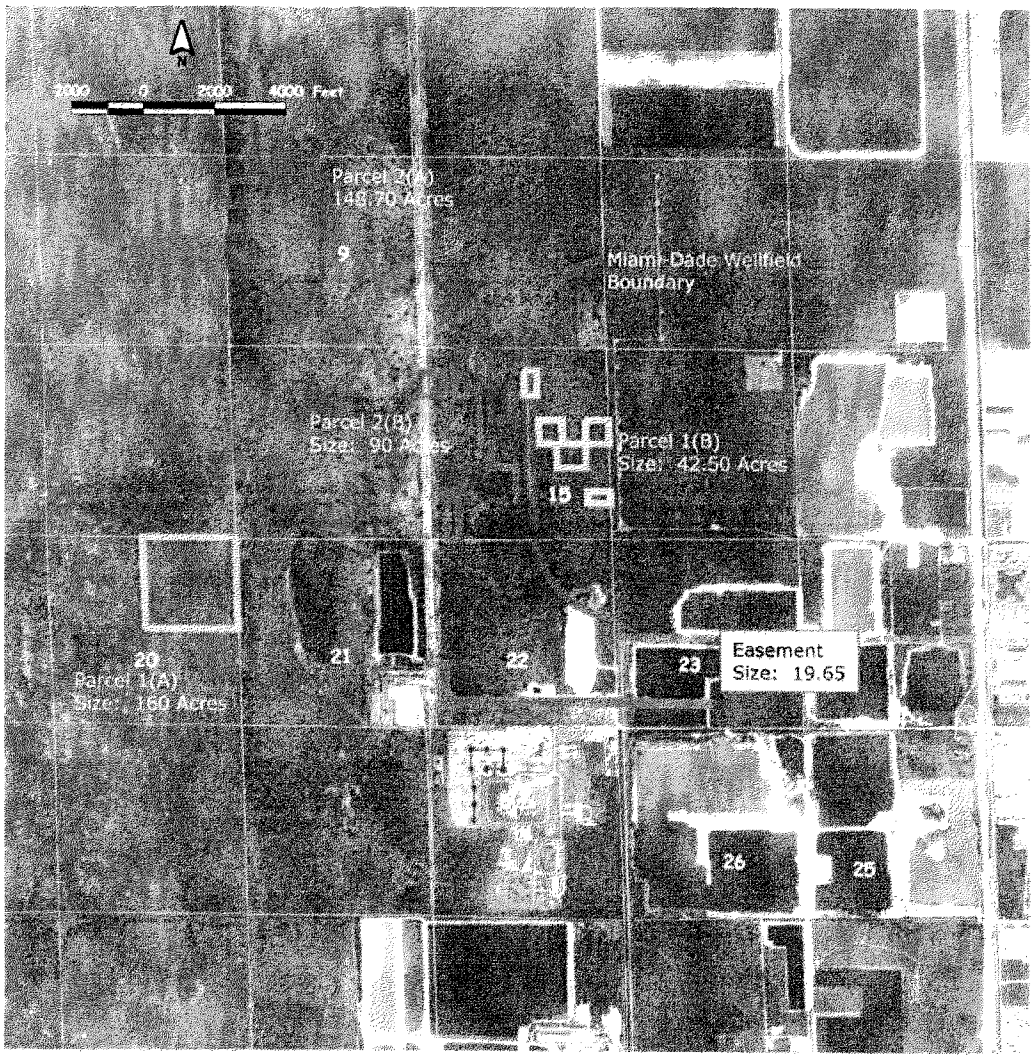


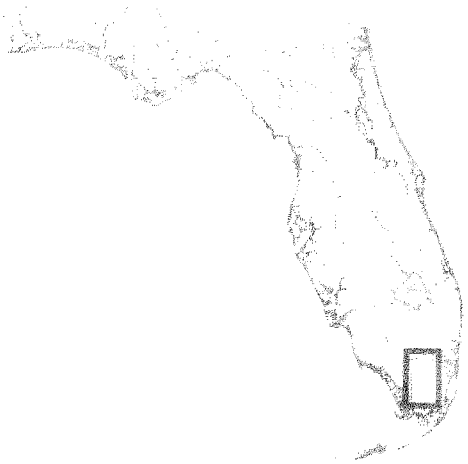
EXHIBIT 3

Proposed Exchange/ Easement
Florida Rock Industries
Miami-Dade County
Township 53 South, Range 39 East



Legend

- Florida Rock owned lands
- State owned lands
- Proposed Easement



FLORIDA

Bureau of Public Land Administration
Project 638/ 731

EXHIBIT 4

Agreement in Principle Between Miami Dade County and Florida Rock
Regarding Section 15 Land Exchange
November 24, 2003

In consideration for the agreement by Miami-Dade County, Florida (the County), not to oppose the land exchange between the State of Florida and Florida Rock Industries, Inc. (Florida Rock) to be considered by the Governor and Cabinet on November 25, 2003, and the Governor and Cabinet's approval of such land exchange:

- Florida Rock hereby grants the County an exclusive and irrevocable Option to Purchase the Properties in Section 15 obtained through the exchange (the "Properties") to the extent that such Properties lie within the wellfield protection line defining rock-mining setbacks (the "mining wellfield setback line") existing on December 15, 2005, as adopted by the Board of County Commissioners.

- The parties shall enter into a mutually agreeable Option to Purchase Agreement within two (2) months from November 25, 2003, which Option to Purchase shall be exercised by the County by March 15, 2006.

- If County exercises the Option to Purchase, the purchase amount for the Properties is the currently appraised value of $10,000 per acre, plus the reasonable closing costs of the exchange with the State, along with an annual escalator based on the consumer price index.

- The closing shall occur within ninety (90) days after the Option to Purchase is exercised, unless otherwise agreed by the parties.

- Florida Rock will not apply to mine any of the Properties prior to March 15, 2006.

- Relative to the Properties only, Florida Rock agrees to waive any and all rights that it has or may have to assert a legal claim of taking or condemnation or assert an action under the Bert J. Harris Act against the County for the County's actions relating to the Properties, including without limitation, adopting a new wellfield-mining setback line or issuing or denying permits for the Properties (County Actions). Additionally, Florida Rock waives any right to seek or recover damages against the County, including, but not limited to, any special, severance or business damages, resulting from County Actions with respect to the Properties.

AGREED to on this 24TH
day of November, 2003

William M. Brant, P.E
Director
Miami-Dade Water and Sewer Department
Miami-Dade County, Florida

AGREED to on this 24TH
day of November, 2003

Scott L. McCaleb
Vice-President
Florida Rock Industries, Inc.